



# F220 Series Detectors with F220-B6RS Base

Installation Manual



**BOSCH**

en English manual

# 1 Legal

## 1.1 Trademarks

CleanMe® is a registered trademark of GE Interlogix in the United States and/or other countries.

Chamber Check® is a registered trademark of Bosch Security Systems, Inc. in the United States.

Chambermaid™ is a trademark of Bosch Security Systems, Inc. in the United States.

ENVI-RO-TECH™ is a trademark of Tech Spray L.P.

TECHSPRAY® is a registered trademark of Tech Spray L.P.

## 1.2 Required Maintenance and Testing

Keep the detector calibrated for proper operation. NFPA 72, The National Fire Alarm Code, recommends performing calibration tests at installation, then every other year.

Depending on local regulations, calibration testing might be required more than once a year.

Perform functional testing yearly.



**NOTE!** Notify all concerned parties before any maintenance or testing of the fire alarm system and upon completion of these activities.

Test the calibration (to meet NFPA 72) using either the magnet test or measuring the calibration with a calibrated product from No Climb Products Ltd. Quickly determine the calibration by a visual inspection of the detector's LED (refer to *Section 4.4 Flash Rate and Trouble Indication* on page 24). These tests confirm whether or not the detector is within its factory marked calibration range.

At least once a year vacuum or wipe the external part of the detector clean. Pay particular attention to the detector screens in areas of heavy insect activity or dust. To clean the chamber,

use a can of clean, dry compressed air (such as TECHSPRAY ENVI-RO-TECH Duster) which is available at office and alarm supply stores. Shorten the plastic tube that comes with the compressed air to about 2 in. (5 cm). Place the tube or needle valve through the Chambermaid valve in the bottom of the detector (refer to *Figure 2.2* on page 6).



**NOTE!** Do not paint the detectors. Paint or other foreign matter covering the detector can prevent smoke detection.

## 2 General Information

This document covers mounting, wiring, power requirements, testing, and maintenance for the F220-B6RS Detector Bases and the F220 Series Heat and Photoelectric Smoke Detectors. Install them according to NFPA 72.



**NOTE!** For proper system installation, read and understand NFPA 72 before installation.

For installation guidelines, refer to *Installation Considerations for Smoke and Fire Detectors* (P/N: 26715).

### 2.1 F220-B6RS Detector Bases

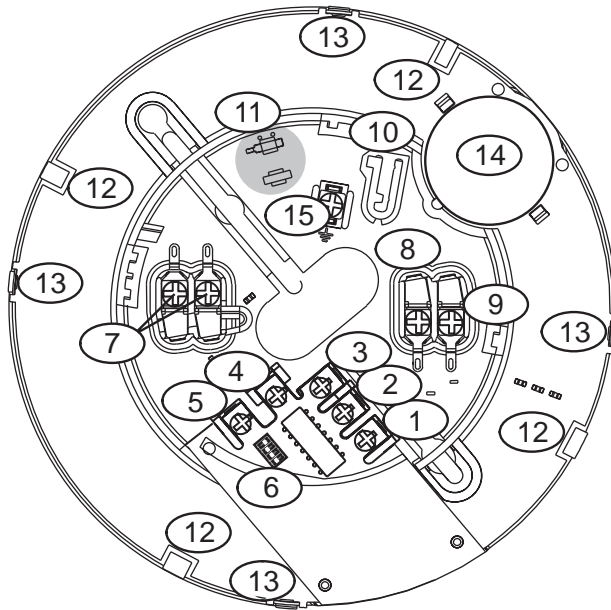
The F220-B6RS is a four-wire base with a Form A alarm relay and a built-in sounder. Other bases (two-wire and four-wire without built-in sounders) are available. Refer also to the *F220 Series Detectors with F220-B6/C/E/R Installation Instructions* (P/N: 4998138694) and the *F220-B6PS/M Installation Instructions* (P/N: 4998149982).

#### 2.1.1 Compatible Control Panels

The F220-B6RS is a four-wire base compatible with all UL Listed four-wire control panels. Refer to the control panel

manufacturer's installation instructions for proper end-of-line (EOL) resistor selection.

## 2.1.2 Base Features



1. Terminal 1	9. Remote Terminal (c)
2. Terminal 2	10. Tamper Tab (Locking Bar)
3. Terminal 3	11. Tamper Tab (Locking Bar Mount)
4. Terminal 4	12. Alignment Key (4 places)
5. Terminal 5	13. Snap Lock (4 places)
6. DIP Switches	14. Sounder
7. Resettable Auxiliary Power Positive (+) In and Out Terminals (b1 and b2)	15. Earth Shield Terminal (optional)
8. Resettable Auxiliary Power Negative (-) In and Out Terminal (a1/a2)	

**Fig. 2.1** Base Features

## 2.2 F220 Series Detectors

### 2.2.1 About F220 Series Detector Heads

The F220 Series Detector Heads listed in *Table 2.1* each require an F220-B6 Series Base.

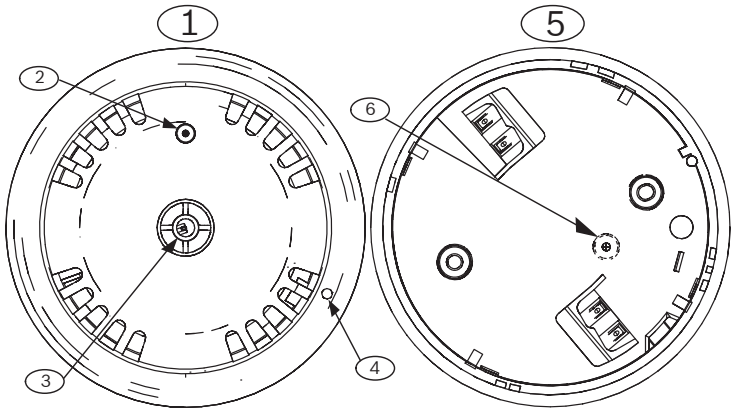


**WARNING!** The F220-PTHC detects carbon monoxide (CO) as a component of a fire. Do not use the F220-PTHC as a stand-alone CO detector.

F220-135	Electronic heat detector 135°F (57°C), fixed temperature and rate-of-rise
F220-135F	Electronic heat detector 135°F (57°C), fixed temperature only
F220-190F	Electronic heat detector 190°F (88°C), fixed temperature only
F220-P	Photoelectric smoke detector
F220-PTH	Photoelectric smoke detector with integral 135°F (57°C) heat sensor
F220-PTHC	Photoelectric smoke detector with integral 135°F (57°C) heat sensor and CO enhanced smoke detection

**Table 2.1** F220 Series Detector Heads

## 2.2.2 F220 Series Detector Features



1. Front of detector	4. Unlocking port
2. Light-emitting diode (LED)	5. Back of detector
3. Thermistor (heat detectors only)	6. Chambermaid location

**Fig. 2.2** Detector Features

## 2.2.3 F220 Series Heat Detector Heads

The F220 Heat Detector Heads can be identified by color coding (refer to *Table 2.2*).

F220-135	No circle around the thermistor
F220-135F	A gray circle around the thermistor
F220-190F	A black circle around the thermistor

**Table 2.2** Distinguishing Heat Detectors



**WARNING!** The F220-135, F220-135F and F220-190F are not life safety devices. Use them with F220-B6 Series bases to provide general property protection.

## 2.2.4 F220 Series Smoke Detector Heads

The F220 Series Smoke Detector Heads are UL Listed, open-area photoelectric smoke detectors that work with commercial fire protective signaling systems and household fire warning systems. Select the appropriate mounting base to configure the detectors for two-wire or four-wire versions (refer to *Section 2.1 F220-B6RS Detector Bases* on page 3).

To verify power to the detector and a functioning smoke sampling circuitry, a dual color LED indicator flashes green every eight seconds when operating normally. It flashes once every four seconds when a trouble condition exists. If the detector determines an alarm condition exists, the LED changes from flashing green to steady red. The detector returns to normal after the alarm condition is cleared and power is interrupted.

Throughout its normal life cycle, the smoke detector monitors and periodically adjusts itself to keep the sensitivity at its factory calibrated level. When excessively dirty, the detector's LED flash rate changes from an eight second flash rate to a four second rate. If CleanMe is selected, the detector sends a CleanMe signal to the compatible control panel to indicate a dirty smoke detector.

Refer to *Section 4.3 Set CleanMe Feature* on page 24.

## 2.3 Technical Specifications

### 2.3.1 General Specifications

<b>Air Velocity</b>	4000 ft/min (1200 m/min) maximum
<b>Operating Temperature</b>	+32°F to 100°F (0°C to 38°C)
<b>Relative Humidity</b>	0% to 95% (non-condensing)

**Table 2.3** Specifications - Detectors and Bases

## 2.3.2 Base Specifications

<b>Alarm Current (only base current, detector current excluded)</b>	
F220-B6RS (with steady sounder and relay):	45 mA at 24 VDC 50 mA maximum at 30 VDC
F220-B6RS (with separately powered sounder only):	30 mA at 24 VDC 35 mA maximum at 30 VDC
<b>NAC Current</b>	30 mA at 24 VDC
<b>Standby Current</b>	10 mA maximum at 30 VDC
<b>Voltage</b>	10.0 VDC to 30.0 VDC

**Table 2.4** F220-B6RS Detector Base Specifications

## 2.3.3 Detector Specifications

<b>Current</b>	
Alarm:	35 mA maximum at 32 VDC
Standby:	0.12 mA maximum
Startup:	0.12 mA maximum
<b>Powerup Time</b>	22 second maximum
<b>Rate of Rise</b>	
F220-135:	15°F/min (9°C/min) or greater

**Table 2.5** F220 Series Detector Heads Specifications

## 2.4 Electrical Supervision

When the F220-B6RS Bases are wired according to the instructions in this document, the control panel initiates a trouble signal when a detector is removed from its base, providing tamper protection. An EOL power supervision module, such as a D275 or an F220-B6E Power Supervision Base and an EOL resistor as specified by the control panel manufacturer, supervises power.

# 3 Install the Bases

## 3.1 Mount the Bases

With the exception of the F220-B6E base, all four-wire bases can be used in any combination within a loop. One F220-B6E



Power Supervision Base can be used as the last base on a loop in four-wire systems to provide power supervision.



**NOTE!** Follow NFPA 72 guidelines for mounting locations. For commercial and industrial installations, 30 ft (9 m) spacing between smoke detectors is recommended.

1. Release the mounting skirt from the mounting base. Use a screwdriver at the location of the snap locks (refer to *Figure 2.1*, item 12, page 4) to release the mounting skirt.
2. Run all system wiring (refer to *Section 3.2 Wire the Bases* on page 10).
3. Mount the base using the two oblong mounting holes. Fits 4 in. square, octagon, AB, and single-gang back boxes.



**NOTE!** Depending on local regulations, you can surface mount the bases using anchors, mollies, or wing nuts, or you can mount directly on back boxes.



**NOTE!** The electrical box must be large enough to accommodate the number and size of conductors specified by the National Electrical Code or any local authorities having jurisdiction (AHJ).

4. Tighten the base to the mounting surface. Tighten only until snug; not distorted.

## 3.2 Wire the Bases

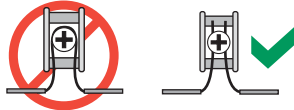


**CAUTION!** When wiring bases, all terminal screws including those not wired must be tightened to prevent loose screw heads from making intermittent electrical contact with the detector head.

### 3.2.1 Terminal Connections



**WARNING!** Do not twist or loop the wires around the terminals. In and out wires for terminal connection must be cut, stripped, and inserted as individual ends.



**NOTE!** Bring the positive (+) wires in on terminal b2 and out from terminal b1. Use a consistent pattern, inputting on b2 and outputting from b1. The negative (-) wires input and output from the same terminal (a1/a2).

### 3.2.2 EOL Resistors

Use the EOL resistors supplied or specified by the control panel manufacturer. This applies to all loop terminations including the D275 Module and the F220-B6E Power Supervision Base.

### 3.2.3 Loop Wiring Specifications

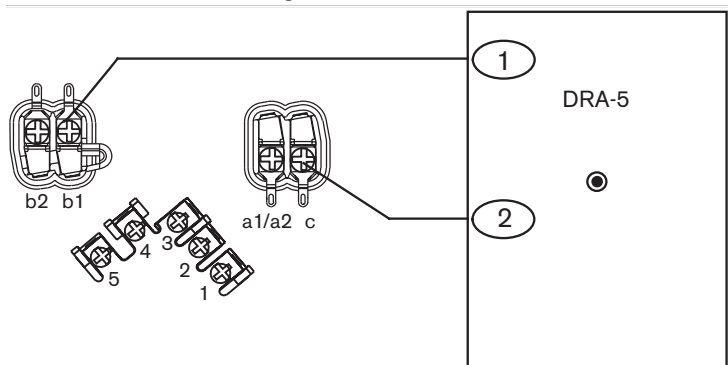
In a four-wire system, the maximum loop length and number of bases that can be placed on a loop depend on the voltage drop on the power circuit. Use standard voltage drop calculations to ensure that the last detector on the loop meets the minimum voltage requirement of at least 16 V.

### 3.2.4 Four-wire Loop Termination

One D275 End-of-Line Module (refer to *Figure 3.5* on page 19) or F220-B6E Power Supervision Base (refer to *Figure 3.4* on page 18) is required for each loop when using four-wire bases.

### 3.3 Wire Optional Remote Annunciators

If using the optional DRA-5 Remote Alarm Indicator, connect the positive (red) wire to terminal b1 and the negative wire (white) to terminal c (refer to *Figure 3.1*).



1. Red wire to Terminal b1 on base	2. White wire to Terminal c on base
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**Fig. 3.1** Optional DRA-5 Remote Annunciator Wiring

### 3.4 Wire F220-B6RS Sounder Bases

The F220-B6RS has a built-in sounder that can be set to operate in one of four ways through a combination of wiring and DIP switch settings (refer to *Figure 3.2*, Item 3 on page 14 and *Table 3.2* on page 15).

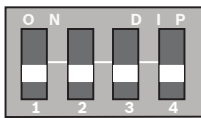
### 3.4.1 NAC Configurations

In these configurations, the sounders are controlled and powered from the control panel's NAC power circuit or a remote NAC power circuit. The positive (+) wire from the NAC or D132B Multi-use Reversing Relay Module connects to Terminal 5 and the negative (-) wire connects to Terminal 4 (refer to *Figure 3.2*, Item 3 on page 14). The sounders on the loop follow the NAC configuration programmed at the control panel. The DIP switches (refer to *Figure 2.1*, Item 15 on page 4) are set as shown in *Table 3.1*.



**WARNING!** DIP switches 1 and 2 must be either both on or both off. Having one on and the other off could result in incorrect operation including failure to alarm.

Position 1 and 2 off;  
3 and 4 either both on  
or both off.



Control panel NAC circuit power is applied to the base to Terminals 4(+) and 5(-). The sounder follows the configuration of the NAC. The positions of switches 3 and 4 have no affect.

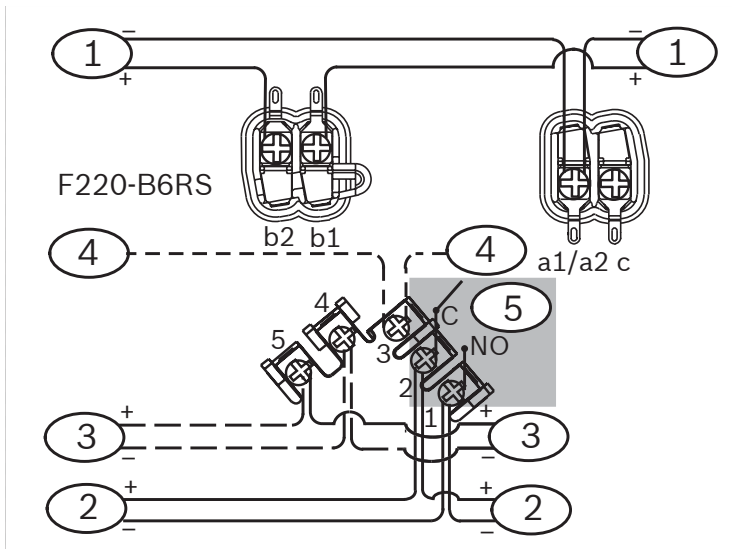
**Table 3.1** NAC Configuration DIP Switch Settings

- NAC Follower (Direct Wire) Configuration: The sounders on the loop follow the signal on the NAC terminals as programmed at the control panel. Refer to the control panel's installation manual for NAC configuration instructions. This configuration requires an extra pair of supervised wires for the sounder circuit (refer to *Figure 3.2*, Item 3 on page 14).
- Reverse Polarity Configuration: The sounders in a loop activate due to reversed polarity on the power line. The output pattern is not controlled by the base in this operating mode; it follows the signal on the head terminals as programmed at the control panel.

### 3.4.2 Local Configurations

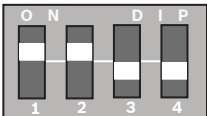
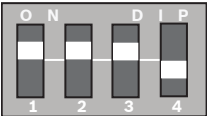
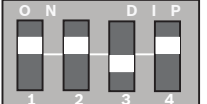
In these configurations, the sounders are controlled and powered from the control panel's power circuit (refer to *Figure 3.2*, Items 1 and 2 on page 14). The initiating device circuit (IDC) wires connect to Terminals 1 and 2 (refer to *Figure 3.2*, Items 3 and 4 on page 14). The DIP Switches are set for one of the following patterns: Temporal (Code 3), March Time, or Continuous Tone (refer to *Table 3.2* on page 15).

- Local Configuration: Each sounder is individually set and activated (refer to *Table 3.2* on page 15).
- Interconnection Configuration: Up to five detectors can be interconnected by a common wire (refer to *Figure 3.2*, Item 4 on page 14, *Table 3.2* on page 15, and *Figure 3.3* on page 17). All sounders within the group activate together. Set all units for the same output pattern (Temporal Code 3, March Time, or Continuous Tone). All interconnected detectors are synchronized with and sound the pattern of the originating detector.



<p>1. Base Power: positive (+) and negative (-) resettable auxiliary power input from the control panel or from a previous four-wire base.</p>	<p>powers the sounders from the control panel so that all sounders follow the control panel's NAC setting.</p>
<p>2. Positive (+) and negative (-) initiating device circuit (IDC) input from the control panel or from a previous four-wire base.</p>	<p>4. Optional interconnection from one base to the next base for up to five F220-B6RS bases. If any of the interconnected detectors signals an alarm, all of the interconnected base sounders are synchronized to the same signalling pattern as the initiating detector's base. Refer to <i>Figure 3.3</i> on page 17.</p>
<p>3. Sounder Power (optional): positive (+) and negative (-) 24 VDC NAC power input from the control panel, a remote NAC, or from a previous four-wire base. This connection</p>	<p>5. Alarm Loop Relay</p>

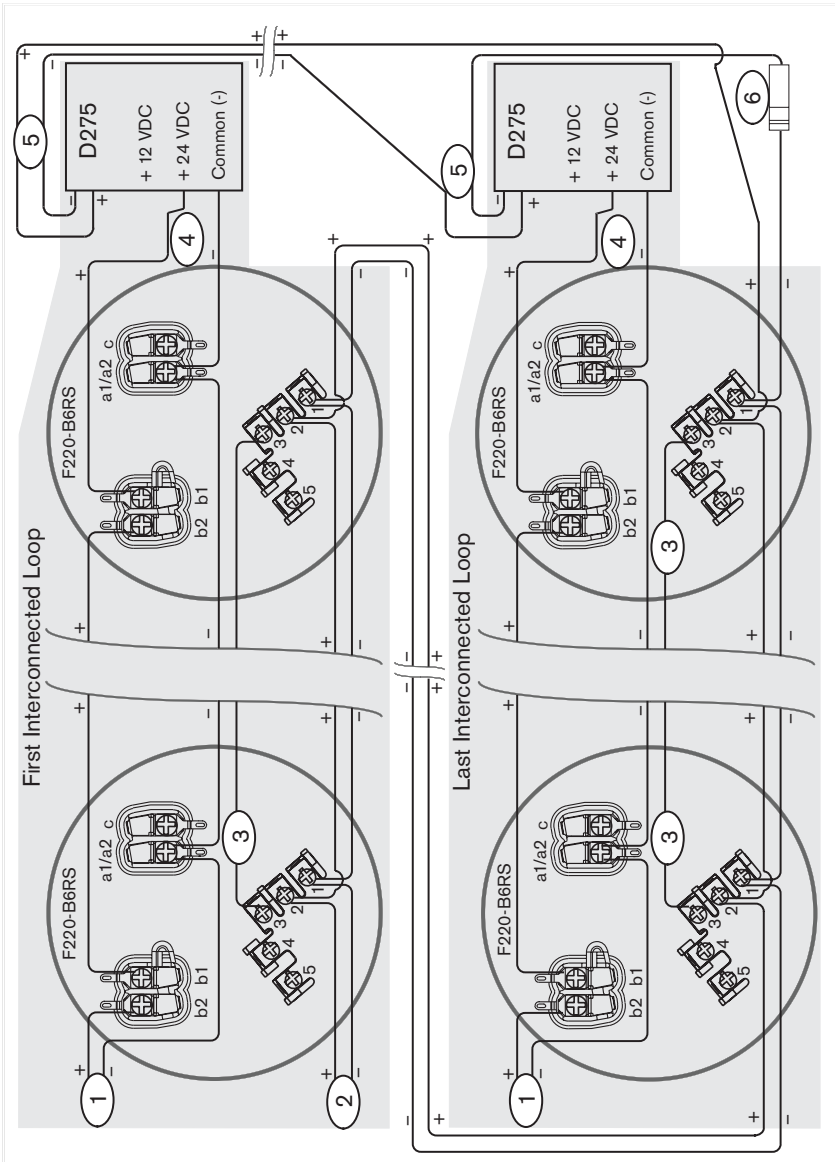
**Fig. 3.2** Wiring F220-B6RS Sounder Bases

<p>Position 1 and 2 on; 3 and 4 either both on or both off.</p> 	<p>Sounder output configured for steady signal (continuous tone)</p>
<p>Position 1, 2, and 3 on; 4 off.</p> 	<p>Sounder output configured for Temporal Code 3 signal</p>
<p>Position 1, 2, and 4 on; 3 off.</p> 	<p>Sounder output configured for March Time signal</p>

**Table 3.2** Local Configuration DIP Switch Settings



**NOTE!** Up to five interconnected units activate per circuit. If more than five units activate, only individual detectors are guaranteed to activate the correct output pattern. Additional interconnected units cannot activate the correct output pattern.





<ol style="list-style-type: none"> <li>1. Positive (+) and negative (-) resettable auxiliary power either in parallel originating from the same power supply or run from separate power supplies.</li> <li>2. Positive (+) and negative (-) initiating device circuit (IDC) from the control panel or an existing circuit.</li> <li>3. Interconnection circuit (connects Terminal 3 from base to base) for up to five bases on a common power supply circuit. Each power circuit must be terminated with an F220-B6E Power</li> </ol>	<ol style="list-style-type: none"> <li>4. Supervision Base or a D275 Power Supervision Module.</li> <li>4. When connecting a D275, connect the positive (+) wire to the yellow input (24 VDC) and the negative (-) wire to Common (black). The red wire is not used.</li> <li>5. The blue wires from the D275 Power Supervision Module provide power supervision.</li> <li>6. An EOL resistor as specified in the control panel's installation instructions.</li> </ol>
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**Fig. 3.3** Interconnection Wiring

Wire Size	Wire Length
18 AWG (1.2 mm)	300 ft (91 m)
16 AWG (1.5 mm)	450 ft (137 m)
14 AWG (1.8 mm)	750 ft (229 m)

**Table 3.3** Maximum Distance from First to Last Interconnected Units

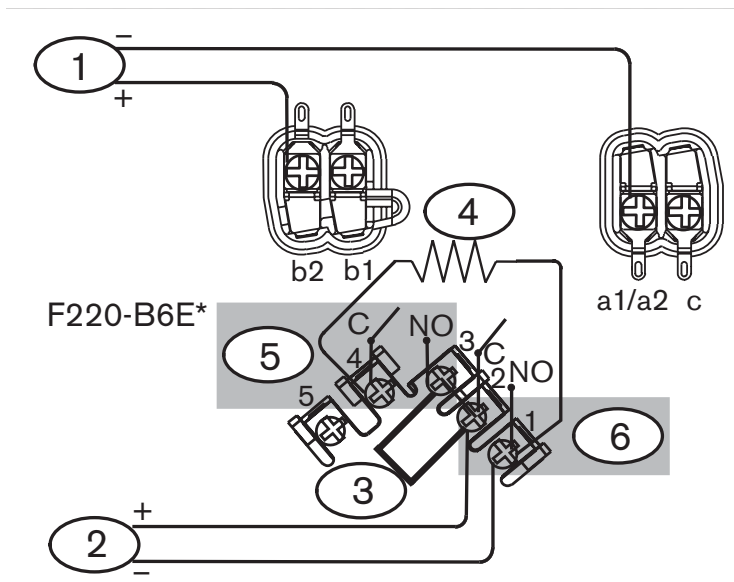


**NOTE!** To ensure interconnected units can alarm, the line load after the last detector must not exceed 10 mA.

## 3.5 Wire Power Supervision Modules

### 3.5.1 Wire F220-B6E Power Supervision Base

The F220-B6E base is wired as shown in *Figure 3.4* on page 18.



1. Power input (positive [+] in on terminal b2; negative [-] in on terminal a1/a2) from the control panel or from a previous four-wire base.	3. Jumper connecting terminals 2 and 3.	previous four-wire base.
2. Initiating device circuit (IDC) input (positive [+] to terminal 2 and negative [-] to terminal 1) from the control panel or from a	4. Place an appropriate EOL resistor (refer to the control panel's installation instructions for resistor specifications) across Terminals 1 and 4.	
	5. Power Supervision Relay	
	6. Alarm Loop Relay	

**Fig. 3.4** Wiring F220-B6E Four-wire Power Supervision Bases

\* The F220-B6E base has a normally-open alarm loop relay that activates when the unit is in alarm and a power supervision relay that activates when power is supplied. Separate power supervision devices, such as the D275, are unnecessary. Use only one F220-B6E per zone run. It must be the last base on the run.

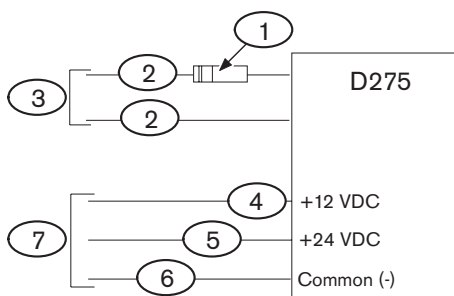
The alarm loop relay (Form A, Terminals 1 and 2) and the power supervision relay (Terminal 3 and 4) are rated for 0.5 A at 120 VAC/DC for resistive loads.



**CAUTION!** Do not connect relays to inductive or capacitive loads. Use with resistive loads only.

### 3.5.2 Wire D275 Power Supervision Module

When a D275 Module is used with 24 VDC systems, connect the yellow wire to the output terminal (b1 or b2). The red wire remains unconnected (refer to *Figure 3.5* on page 19).



1. EOL resistor (refer to the control panel's installation instructions for specifications).	to Terminal 1 on the last base on the loop.
2. The positive (+) and negative (-) IDC wires (blue) from the D275.	4. Red wire is not used.
3. Connect the positive (+) IDC wire through the EOL resistor to Terminal 2 and the negative (-) IDC wire	5. Yellow wire to Terminal b1 on last base on loop for 24 VDC systems.
	6. Black wire (common) to Terminal a1/a2 on last base on loop.
	7. Power loop

**Fig. 3.5** Wiring a D275 Power Supervision Module as a Loop Terminator

## 4 Install the Detector Heads

### 4.1 Mount the Detector Heads



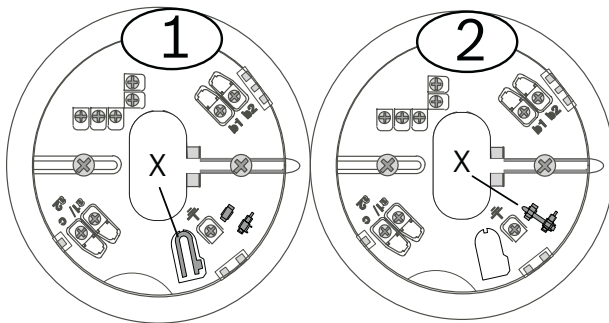
**CAUTION!** Before mounting detector heads, all terminal screws in the base including those not wired must be tightened to prevent loose screw heads from making intermittent electrical contact with the detector head.



**NOTE!** When using F220-B6RS Sounder Bases, set the DIP switches for desired operation and sounder signal pattern before installing the detector heads.

#### 4.1.1 Optional Locking Bar

Each base has a snap-off locking bar as part of the base molding. Engage the locking bar to prohibit unauthorized detector removal. To engage the locking bar, move it to the position shown in *Figure 4.1*.



1. Snap locking bar (X) off base molding

2. Insert locking bar (X) into locking bar mount until fully engaged

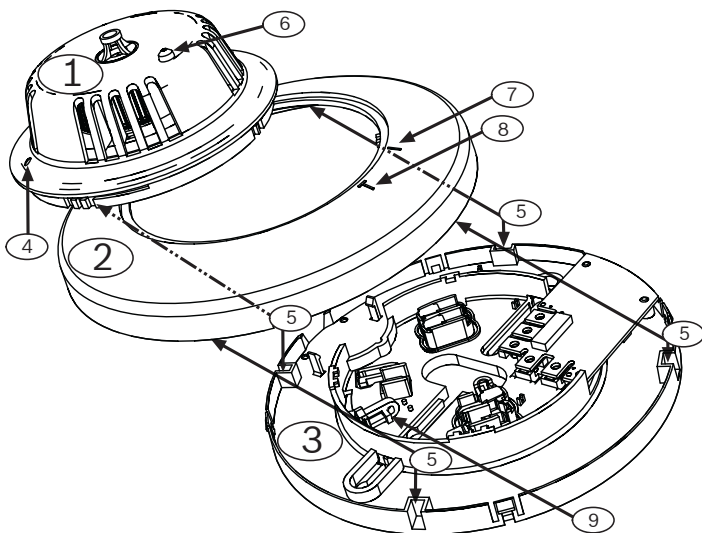
**Fig. 4.1** Engaging the Locking Bar



**CAUTION!** When using the locking bar, before installing the detector head, open the unlocking port (refer to *Figure 4.2*, Item 4) by poking through the plastic with a screwdriver.

### 4.1.2 Mounting Skirt (*Figure 4.2*, Item 2)

Align the four alignment keys (refer to *Figure 2.2*, Item 12 on page 6 and to *Figure 4.2*, Item 5) and press the mounting skirt firmly down onto the mounting base (*Figure 4.2*, Item 3) to engage the snap locks



1. Detector head (heat detector shown in example)	the mounting skirt and four corresponding places on the base)
2. Mounting skirt	6. LED
3. Mounting base	7. Bar on mounting skirt
4. Locking port	8. T mark on mounting skirt
5. Alignment keys (four places on the bottom of	9. Locking bar in locked position

**Fig. 4.2** Part Orientation for Mounting

### 4.1.3 Detector Head



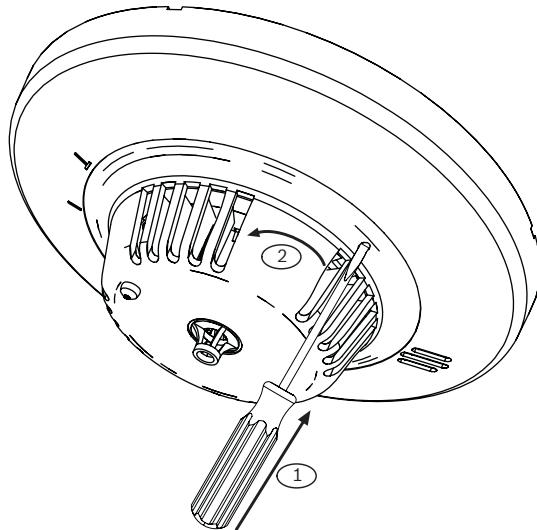
**CAUTION!** The mounting skirts and detector heads are keyed. Do not force them onto the mounting bases.

#### Install:

Install the detector head by lining up the LED on the detector head (refer to *Figure 4.2*, Item 6 on page 21) with the bar on the mounting skirt (refer to *Figure 4.2*, Item 7). Turn the detector head clockwise until the LED aligns with the T mark on the mounting skirt (refer to *Figure 4.2*, Item 8).

#### Remove:

Remove the detector ahead by turning it counter-clockwise. If the optional locking bar is used, refer to *Figure 4.3*.



- |   |   |
|---|---|
| 1. Insert screwdriver through the locking port and depress the locking bar. | 2. Hold the locking bar down while turning the head counter-clockwise until disengaged. |
|---|---|

**Fig. 4.3** Unlocking the Locking Bar

## 4.2 Set Detector Modes

The F220 Series Smoke Detectors feature a unique magnet-operated sensitivity mode and detector test mode.

### 4.2.1 Test Mode

Test the detector by placing the magnet next to the T mark on the mounting skirt for three consecutive flashes to cause an alarm.

### 4.2.2 Sensitivity Mode

If the magnet is next to the T mark for less than three flashes but more than one flash, the detector enters Sensitivity Mode.

1. Place the detector into Sensitivity Mode.
2. Wait for the first single green LED flash.
3. Count the number of red LED flashes that follow and refer to *Table 4.1* on page 23 for sensitivity definitions.

Number of Red Flashes	Sensitivity Definition (% Obscuration)
1	Malfunctioning smoke or heat detector
3	Normally operating smoke or heat detector with little or no dirt contamination
4 to 6	Progressively more contamination
7 to 10	Trouble condition, very dirty but still compensated to 3%/ft (3%/ft = 0.433 db/m); Sensitivity < 3% at 10 flashes.
11	Sensitivity < 2.5%/ft (2.5%/ft = 0.36 db/m)
12	Sensitivity < 2.0%/ft (2.0%/ft = 0.287 db/m), chance of false alarm increases
13	Sensitivity < 1.5%/ft (1.5%/ft = 0.214 db/m)
14	Sensitivity < 1.0%/ft (1.0%/ft = 0.143 db/m), chance of false alarm greatly increases
15	Sensitivity < 0.5%/ft (0.5%/ft = 0.071 db/m), false alarm likely

**Table 4.1** Red LED Flash Definition

4. The detector exits sensitivity mode and returns to one green LED flash every eight seconds.

## 4.3 Set CleanMe Feature

The Clean Me feature monitors the smoke chamber's sensitivity and sends a trouble signal to the control panel when the sensitivity degrades to a preset level.



**NOTE!** When a CleanMe signal is sent to a control panel that is not CleanMe compatible, the signal may be misinterpreted as an alarm.

To activate the CleanMe feature:

1. Put the detector into sensitivity mode by placing a magnet next to the T mark on the mounting skirt (refer to *Figure 4.2*, Item 8 on page 21). Remove the magnet after the first red LED flash and before the third red LED flash.
2. When the magnet is removed, the LED flashes green once and shows the first of two sensitivity displays.
3. When the LED next flashes red, replace the magnet near the T mark (refer to *Figure 4.2*, Item 8 on page 21).
4. Hold the magnet against the T mark on the mounting skirt (refer to *Figure 4.2*, Item 8 on page 21) until the green LED flashes twice and the red LED repeats the sensitivity indication.
5. The detector exits sensitivity mode. If CleanMe has been successfully enabled, the green LED flashes twice in rapid succession every eight seconds indicating that CleanMe is activated.

To disable CleanMe, repeat this process and verify the double flash returns to a single flash.

## 4.4 Flash Rate and Trouble Indication

These detectors include the Chamber Check Automatic Trouble Indicator that verifies the detector's calibration is within the factory listed range. NFPA guidelines for sensitivity testing can



be met by visually inspecting the detector and checking the flash rate of the LED.



**NOTE!** Perform the visual check before resetting power. After a reset the trouble indicators clear for 70 seconds. After 70 seconds, if the detector is in a trouble condition, trouble indications begin again.

A unit with CleanMe activated double flashes (two flashes within a half second of each other) every eight seconds. A normally operating unit flashes once every eight seconds. If a detector is in a trouble condition due to a dirty lens or a sensor malfunction, it single or double flashes every four seconds. If enabled, the CleanMe trouble signal is sent. If the calibration is out of range for more than 24 hours, the green LED on the detector flashes approximately once every four seconds.

## 5 Test the Installation

### 5.1 Inspect the Installation

1. Check the wiring from the control panel to the last head on each run for proper polarity and continuity.
2. Terminate each run with an EOL resistor as specified by the control panel manufacturer.
3. Terminate four-wire runs with EOL power supervision modules or F220-B6E bases.
4. Apply power to the system. Check for alarms and troubles.
5. Note which detectors alarmed (if any), shut down the system, remove alarmed detectors from their bases, and recheck the bases for proper wiring.
6. If the problem persists, determine if the problem is caused by the detector or the base. Replace the affected detectors or bases with known good units.
7. If a system alarm occurs with no detector alarms present, remove all detectors and check the wiring at each base.
8. Check the wiring of each EOL resistor and EOL module.

9. When the system is alarm free, check each detector to ensure that the green LED indicator flashes approximately every eight seconds. This verifies the detector is receiving power and operating properly.



**NOTE!** If a heat detector LED flashes at a rate of 4 flashes/sec, the detector is either cold (below +32°F [0°C]), out of sensitivity range, or defective. If a smoke detector flashes at a rate of 4 flashes/sec, it is either out of sensitivity range or defective.

## 5.2 Test Each Detector

Test each detector to ensure it causes a control panel alarm. Reset the control panel after each test.

### 5.2.1 Activate an Alarm at Each Detector

**To cause heat detectors to alarm either:**

- Activate the internal reed switch by placing a magnet horizontally against the T mark on the mounting skirt and holding it there for three consecutive LED flashes, or
- Expose the thermistor to a heat source such as a hair dryer or a shielded heat lamp until the detector alarms and the alarm LED lights .

**To cause smoke detectors to alarm either:**

- Activate the internal reed switch by placing a magnet horizontally against the T mark on the mounting skirt and holding it there for three consecutive LED flashes, or
- Use a UL Listed aerosol smoke detector tester to simulate an alarm. Follow the instructions provided with the aerosol smoke detector tester.

### 5.2.2 Reset the Control Panel

When a detector alarms, the red LED indicator activates and latches into the ON position. Clear the alarm by momentarily removing power before proceeding to the next detector.

### 5.3 Test the Alarm Loop

Check the voltage across the EOL resistor of each alarm loop to verify wiring losses do not exceed control panel manufacturer's specifications.

### 5.4 Test any CO Sensors

Removing the detector head or resetting the detector's power places the detector in a special test mode for 15 minutes. If over 35 ppm of CO is applied to the detector within this 15-minute period, the detector must alarm or it is defective.



**WARNING!** The F220-PTHC detects carbon monoxide (CO) as a component of a fire. Do not use the F220-PTHC as a stand-alone CO detector.

### 5.5 Perform NFPA 72 Required Testing

Refer to *Section 1.2 Required Maintenance and Testing* on page 2.

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